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THE BIOLOGY AND STATUS OF STOCKS OF SMALL TUNAS

Report of an *Ad Hoc* Committee of Specialists

Honolulu, Hawaii, U.S.A., 15-18 December 1975

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
Rome, 1976

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PREPARATION OF THIS PAPER

This paper was prepared as one element of the cooperative project of the United Nations Environment Programme and the Food and Agriculture Organization on the monitoring of environmental effects on marine world fishery resources. It consists of the report of a meeting of the Ad hoc Committee of Specialists to Review the Biology and Status of Stocks of Small Tunas, which was sponsored by FAO's Expert Panel for the Facilitation of Tuna Research. Attendance at the meeting was supported by the FAO/UNEP project. This document was prepared with considerable assistance from others who participated in the meeting, especially the scientific and support staff of the Honolulu Laboratory of the Southwest Fisheries Center, National Marine Fisheries Service, NOAA.

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Participants in the meeting
Members of ACMRR
Panel of Experts for the Facilitation of Tuna Research
Members of the Indian Ocean Fishery Commission
Members of the Indo-Pacific Fisheries Council
ICCAT
I-ATTC
FAO Department of Fisheries
Fishery Officers in FAO Regional Offices
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REPORT OF THE AD HOC COMMITTEE MEETING OF SPECIALISTS TO REVIEW THE BIOLOGY AND STATUS OF STOCKS OF SMALL TUNAS

Honolulu, Hawaii, U.S.A., 15-18 December 1975

1. OPENING OF THE MEETING

The FAO-sponsored Ad Hoc Committee of specialists to review the biology and status of stocks of small tunas met in Honolulu, Hawaii (U.S.A.) from 15 through 18 December 1975. A list of the members of the Committee and other participants is given in Appendix A of this report. Mr. Shomura, Director of the Honolulu Laboratory, Southwest Fisheries Center, National Marine Fisheries Service, organized the meeting at the request of FAO and chaired the session.

After welcoming participants, Mr. Shomura reviewed the general terms of reference for the meeting. These terms of reference were:

(i) review and discuss the biology and status of stocks of species or groups of species belonging to Auxis spp., Euthynnus spp., Sarda spp., Thunnus atlanticus, T. tonggol, and Scomberomorus spp.

(ii) review briefly other species of small tunas, including Katsuwonus pelamis.

(iii) make recommendations to FAO on what the Working Party on Development of Fisheries for Species of Small Tunas should consider in their future deliberations and activities.

2. ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE MEETING

The agenda, as adopted by the participants, is given in Appendix B of this report. The background papers that provided the principal references for the meeting are listed in Appendix C. The complete list of documentation for the meeting is given in Appendix D.

3. CODEX ALIMENTARIUS

The Committee discussed the draft Standard for Canned Tuna and Bonito in Water or Oil (ALIFORM 74/18) and its possible effects on development of fisheries for small tunas not currently included in the list considered for adoption by the Codex Alimentarius Commission. The Committee noted that omission of several genera of tunas and bonitos including Auxis, Allothunnus, Cybiosarda, Gymnosarda, and Orcynopsis, could have an undesirable influence on a country's plans to develop fisheries for those species for the international market trade. Under the proposed standards, Auxis should not be sold as either tuna or bonito; however, many developing countries have no prejudices against packing Auxis as tuna. The Committee noted that Auxis probably has the packing qualities of other tuna species currently being canned; therefore, the Committee recommended that Auxis be considered for inclusion in the tunas and bonitos by the Codex Alimentarius Commission. It was suggested that the concern of the Committee be made known to the Joint FAO/WHO Food Standard Programme CODEX ALIMENTARIUS COMMISSION.

4. REVIEW OF THE BIOLOGY AND STATUS OF STOCKS OF SMALL TUNAS

The Committee reviewed a list of species in the family Scombridae which could be included in the general category of "small tunas and related species." Based on the general information available, the Committee agreed to confine detailed discussion to a group which included Katsuwonus pelamis, Auxis spp., Sarda spp., Euthynnus spp., Thunnus atlanticus, T. tonggol, and Scomberomorus spp. Detailed discussion of a second category, which included species of Acanthocybium, Gymnosarda, Allothunnus, Cybiosarda, Gasterochisma, Orcynopsis, and Grammatorcynus, was left for a future meeting of the Working Party on Small Tunas. The Committee commented that species in the genera Rastrelliger and Scomber already formed the basis of important fisheries in many parts of the world and were the subject of considerable research; thus, the Committee did not consider these groups at this meeting.

The following provides a summary of the discussions on species listed in the first category:

4.1 Katsuwonus pelamis

The Committee noted with appreciation the excellent background paper on skipjack tuna prepared by Walter M. Matsumoto and Robert A. Skillman (see Appendix C).

Although the Committee reviewed only briefly the status of skipjack tuna, the Committee noted that this species is worldwide in distribution, forms the basis of substantial fisheries throughout the world, and is first in total world landings among the tunas. Because of its importance, the Committee felt that the skipjack tuna deserved the full attention of a separate Working Party whose sole purpose would be to review and assess on a continuing basis the biology and stocks of skipjack tuna throughout the world.

4.1.1 Taxonomy

The taxonomic identity of skipjack tuna, Katsuwonus pelamis, presents no problems.

4.1.2 Statistics

The skipjack tuna is easily recognized visually and is seldom confused with other species by fishermen. In some countries, however, the skipjack tuna is often referred to as bonito and hence there is a problem with the recording of statistics at national and international levels.

The Committee noted that in the past considerable quantities of skipjack tuna have been recorded as "tuna" or "bonito." However, with the recent increase in the market price of skipjack tuna there has been an increasing amount of other species, e.g. Euthunnus, being reported as skipjack tuna. A further complication is that unknown quantities of small skipjack tuna are dumped at sea for various reasons

Compared to other small tunas, the skipjack tuna catch statistics are comparatively good; however, in view of the dominance of this species in the world tuna landings, the catch and effort statistics of skipjack tuna are not sufficiently standardized for reliable assessment of the stock size.

4.1.3 Current utilization

It is estimated that the following catches were made in 1974 from the world's oceans:

Pacific Ocean	575,000	metric	tons
Indian Ocean	50,000	"	"
Atlantic Ocean	115,000	"	"
Total	740,000	"	"

4.1.4 Future utilization

Over the past several years the world catch of skipjack tuna has steadily increased; it is believed however, that the resource can be exploited at a still higher level. The actual magnitude of skipjack tuna stocks cannot be ascertained at present and all available estimates are to be considered preliminary at best.

4.1.5 Research requirements

Considering the importance of this species in the world catch of tuna and the known lack of data on many aspects of its biology, the Committee feels that more attention and funds should be allocated to the research on this species. At present our understanding of the population dynamics is so inadequate that none of the proposed population models appears to reflect an actual situation.

4.1.6 Management problems

As the skipjack tuna is mobile, far ranging species exploited by fishermen of numerous nations, management of the stocks will have to be on an international basis.

4.2 Auxis spp.

4.2.1 Taxonomy

The Committee noted that in certain areas of the world, two species of Auxis are recognized. In Japan the two species are separated in the market, since one commands a higher price than the other, but they are not separated in the published statistics of Japan. In the Indian Ocean there apparently is no problem in separating the species. In west Africa, where the two species occur, no distinction is made between the two. There is some evidence (document Ad Hoc ST/11 referenced in Appendix C) to indicate that morphological characters used to differentiate Auxis thazard from A. rochei in the Atlantic Ocean were not reliable, and that there may be only a single species of Auxis.

The Committee noted that confusion is created by using the common name frigate mackerel for species of Auxis. Thus, Auxis is often confused with other "mackerel" species, e.g. horse mackerel, Trachurus spp. (a carangid), Pacific and Atlantic mackerel, Scomber spp. (a scombrid), and Spanish mackerel, Scomberomorus spp. (another scombrid).

4.2.2 Statistics

The Committee noted that the published statistics of Auxis underestimates the true catch of this group. Underreporting is attributed to (i) artisanal catches not being fully reported, (ii) the confusion and inclusion of Auxis with other species, and (iii) catches of Auxis often being discarded. With reference to the latter, the amount of Auxis discarded in some years by the tuna fleets in the eastern Pacific Ocean and the eastern Atlantic Ocean probably exceeds the published landings. It was pointed out that the problem of discards does not occur in the Indian Ocean and that the catch of Auxis is fully utilized there.

The Committee noted that from a numerical standpoint, Auxis is probably the most abundant of the tunas. This observation was based on the oceanwide distribution of larval and juvenile Auxis, the common occurrence of Auxis in stomachs of predator fishes, and the high counts of Auxis larvae in plankton hauls.

4.2.3 Current utilization

Although reliable data are not available, the Committee felt that the amount of Auxis currently being utilized is probably between 60,000 and 100,000 metric tons. The estimated breakdown by oceans is:

Atlantic Ocean	15,000-20,000	metric tons
Pacific Ocean	30,000-60,000	" "
Indian Ocean	15,000-20,000	" "

While most of the larger tuna species are used predominately for canning, the present utilization of Auxis is extremely varied. In Japan, Auxis is dried to produce "kezuri-bushi" and "namari-bushi," eaten raw as "sashimi," and used as pet food. In Sri Lanka, Auxis is utilized fresh in curry dishes or pickled with tamarind and salt. Fair amounts of Auxis are also used as longline bait in the Indian Ocean. In the Maldive Islands, Auxis is boiled and dried, while in Africa it is smoked, dried, or utilized fresh. It was noted that in some areas Auxis is packed and sold as tuna.

4.2.4 Future utilization

The Committee discussed at some length the prospects of increased utilization of this group in the future. It was pointed out that this group is noticeably absent from the current international market trade, probably because the cost of processing the small Auxis is too high for present canning procedures. The Committee noted that while reliable total yield estimates are not available, the Auxis resource is probably large enough to provide for a substantial increase in catch; however, based on current economics and market structures, the world production will probably not increase to the level of maximum sustainable yield for the species of Auxis considered.

4.2.5 Research requirements

The Committee noted that considerable work needs to be done on Auxis including species identification, stock identity, and stock assessment.

The Committee also noted that a considerable amount of detailed published and unpublished data on larval Auxis are available. However, these data have not been synthesized and analyzed thoroughly.

4.2.6 Management problems

The Committee noted that the potential world yield of Auxis is great, and for the near future did not foresee any management problems other than on a localized level.

4.3 Sarda spp.

4.3.1 Taxonomy

No major problems; the Sarda group has been recently reviewed taxonomically by Collette and Chao (1975).

4.3.2 Statistics

The Committee noted that the reported catches of Sarda in the Atlantic Ocean for past years were overestimates, since they included other species which were labeled bonito. It was pointed out that even the skipjack tuna were placed under the bonito category by some countries. In the eastern Pacific the catch statistics of Sarda chiliensis were reported to be reliable. In the western Pacific, however, there appears to be a need to upgrade the collection of adequate statistics.

4.3.3 Current utilization

Bonito is consumed fresh or canned. The Committee noted that canned bonito is sold as tuna in some countries. It was emphasized that canned bonito has good texture and flavor. Estimates of world utilization of bonito were as follows:

Atlantic Ocean	10,000- 60,000	metric tons
Pacific Ocean	20,000-120,000	" "
Indian Ocean	500- 1,000	" "
Total	30,500-181,000	" "

The Committee drew special attention to the fact that the bonito landings of several fisheries, e.g. Peru, showed very wide fluctuations.

4.3.4 Future utilization

The Committee noted that a major expansion of the fishery for bonito accompanied by consistently high catches is not likely to occur on a worldwide basis; however, there appears to be a potential for the development of fisheries for bonito in the Indian Ocean and Red Sea.

4.3.5 Research requirements

The mechanism responsible for the wide fluctuation in catches of bonito needs to be understood. Studies on stock identity and stock assessment need to be undertaken, especially the identity of the bonito stock found off the coasts of Peru and Chile. There is a paucity of reliable data on the age and growth of bonito; the several studies available have indicated drastically different age and growth estimates. The Committee noted that the use of a different aging technique, e.g. reading daily growth increments on otoliths, may solve this problem.

4.3.6 Management problems

On the basis of available information, the Committee concluded that the *Sarda* stocks were localized and thus problems in management would probably be best examined on a subregional level.

4.4 *Euthynnus* spp.

4.4.1 Taxonomy

No major problems; three species have been clearly defined.

4.4.2 Statistics

The reported catch of *Euthynnus* is generally considered to be an underestimate. This group is often listed as bonito or skipjack tuna, or is confused with *Auxis*; catches of *Euthynnus* are sometimes not reported at all. The Committee expressed concern that discards at sea by the tuna fleets may represent a substantial part of the unreported catch.

4.4.3 Current utilization

While the reported catch has been given as 39,000 metric tons (32,000 tons from the Pacific and Indian oceans, 7,000 tons from the Atlantic Ocean), the Committee considered a truer figure to be around 60,000 metric tons (40,000 tons from the Pacific and Indian oceans and 20,000 tons from the Atlantic Ocean). *Euthynnus* is utilized fresh, smoked, and dried, and is also canned for human consumption and pet food.

4.4.4 Future utilization

Although the magnitude of the *Euthynnus* resource cannot be estimated from available information, the coastal nature of this species suggests that the stock size in a given area may be relatively small. This is especially true when *Euthynnus* is compared to *Auxis*; the latter is considered by the Committee to represent a very large resource base. The Committee noted that any major exploitation of *Euthynnus* will remain an adjunct to fishing for other tuna species.

It is conceivable that *Euthynnus* will grow in importance in some small-scale coastal fisheries.

4.4.5 Research requirements

There is need for studies on stock identity and stock assessment. The Committee felt that it was difficult to recommend major research undertakings for this group since Euthynnus does not dominate the catch of tuna in any area. Research on this group, thus will probably be subsidiary to research on other tuna species.

4.4.6 Management problems

The Committee noted that there did not appear to be any immediate management problems with Euthynnus, however, the Committee cautioned that care should be exercised in expanding a fishery for Euthynnus since the stocks appear to be small and discrete.

4.5 Thunnus atlanticus

4.5.1 Taxonomy

This species is found only in the Atlantic Ocean and its taxonomy poses no problems.

4.5.2 Statistics

The Committee noted that the reported catches of blackfin tuna are probably underestimates of the true catches, since blackfin tuna have been reported together with catches of skipjack tuna and other tuna species. Further, it was noted that some of the catches of blackfin tuna were not reported at all. A factor mentioned in the incorrect listing of this species was that it is at times confused with small bigeye and yellowfin tunas. On the basis of available information it appears that the total blackfin tuna catch ranges from 500 to 2,000 metric tons annually.

4.5.3 Current utilization

Currently 500 to 2,000 metric tons of blackfin tuna are landed and the catch is utilized mainly as fresh or canned products.

4.5.4 Future utilization

The Committee was of the opinion that a substantial increase in the catch of blackfin tuna is not expected with the present methods of fishing employed, i.e., trolling, live-bait fishing, and longlining.

4.5.5 Research requirements

The principal research need is for a stock assessment. There have been unconfirmed reports of the occurrence of this species in the eastern Atlantic Ocean; this needs to be verified.

4.5.6 Management problems

The occurrence of this species for brief periods off the coasts of several countries in the western Atlantic suggests that it migrates extensively. If this is the case, management problems will be at a regional level and international in scope.

4.6 Thunnus tonggol

4.6.1 Taxonomy

Although the name T. tonggol has been accepted as valid, the Committee was informed that biological indicators of T. tonggol from different areas suggested a possible occurrence of subspeciation. Differences have been noted in the size of fish at maturity, L_∞, length of pectoral fin, robustness of body, and in length-weight relationships of fish from different areas.

4.6.2 Statistics

The Committee was of the opinion that problems in statistics would arise, since the differentiation of T. tonggol from the young of other tunas is extremely difficult and since it occurs in that part of the world where the collection of adequate statistics is a problem. The Committee noted the need to improve data collection and the need to report tuna catch by its specific name.

4.6.3 Current utilization

No accurate estimate of current utilization was available since catch data were lacking from several fisheries; however, the Committee considered that the current annual catch of T. tonggol was probably on the order of 20,000 metric tons.

4.6.4 Future utilization

On the basis of available information, an increase in catch of T. tonggol from areas where it is presently being fished is not expected to be great; any increase will probably not exceed twice the current annual catch. There is a possibility that the potential catches from areas of its known occurrence, not presently fished, could be sizable.

4.6.5 Research requirements

The Committee agreed that stock identification and stock assessment studies were needed. Research conducted on a localized level may be adequate for this species since it is restricted largely to nearshore waters.

4.6.6 Management problems

The restricted distribution of T. tonggol to nearshore areas suggests that management problems may be of a subregional level rather than being of an oceanwide, international dimension.

4.7 Scomberomorus spp.

4.7.1 Taxonomy

The taxonomy of this genus is not well defined; however, the Committee was informed that Dr. Bruce B. Collette of the National Marine Fisheries Service Systematics Laboratory was in the process of examining this problem.

4.7.2 Statistics

Although all species of this group are highly marketable, the catch statistics for this group were considered to be generally inadequate. For some countries the catches of several species of the group are combined principally because species differentiation is difficult. The Committee noted that at times the catch of *Acanthocybium* is included with *Scomberomorus*; thus further complicating the catch statistics.

4.7.3 Current utilization

FAO catch statistics for 1972 indicated that 76,000 metric tons of *Scomberomorus* were caught worldwide; however, the Committee, after evaluating the shortcomings of the reported landings, estimated that the true catch was probably around 150,000 metric tons annually. The greatest utilization of this group occurs in Southeast Asia, where the catch is primarily processed through local fresh fish markets.

4.7.4 Future utilization

To date there has been no attempt to quantitatively assess the stock size of any species of *Scomberomorus*; however, in light of the historical trends in catches and the great amount of fishing effort expended for these species, a significant increase in landings seems unlikely. The Committee did note that catches could perhaps be increased in some areas, e.g. Fiji, New Caledonia, and Brazil.

4.7.5 Research requirements

While circumstantial evidence indicates that the stocks of these species are fairly localized, the extent and the migration patterns of stocks supporting the more valuable fisheries must be determined.

4.7.6 Management problems

The stock structure of none of the species of *Scomberomorus* is known; thus, the number of countries fishing a given stock is not known. The Committee noted that management of *Scomberomorus* stocks will probably be complicated by the fact that other species are taken by the fishery. The multispecies aspect also complicates the evaluation of catch per unit of effort data.

4.8 *Other small tunas (Orcynopsis unicolor, Cybiosarda elegans, Acanthocybium solandri, Allothunnus fallai,* and *Gasterochisma melampus)*

4.8.1 Taxonomy

There appears to be no problem with the taxonomy of these species.

4.8.2 Statistics

The total landings of the several species of tunas considered in this section probably do not exceed several thousand tons annually.

Commercial catches of these species make up a minor and incidental segment of various fisheries; thus, catch statistics are generally not available. It has been estimated that 300-500 metric tons of Orcynopsis unicolor and about 1 metric ton of Cybiosarda elegans are landed. Acanthocybium solandri is caught with longline gear and is often included in the catch statistics of the longline fishery.

4.8.3 Current utilization

Most of the catch of these species is processed through fresh fish markets. The Committee noted that A. solandri landed in American Samoa is canned for local consumption. The annual pack of this species in American Samoa is approximately 3,800 cases.

4.8.4 Future utilization

With the exception of A. fallai, the Committee felt that there is very little likelihood of substantially increased catches of these species under existing fishing conditions.

4.8.5 Research requirements

In view of the very small catches of these species on a worldwide basis and the improbability of any substantial increase in catch, the Committee did not recommend concerted research of these species at this time. The Committee noted that Japan may have some data on several species and suggested that the Working Party of Small Tunas may wish to ask Japan to prepare brief status reports of A. fallai and G. melampus.

4.8.6 Management problems

None known.

5 SUMMARY AND RECOMMENDATIONS

Highlights of the current status of selected species of small tunas are summarized in Table 1. The Committee noted that some problem areas were common to the several species or groups of species under discussion. General and specific recommendations made by the Committee for consideration by FAO are provided in the following sections:

5.1 General recommendations

5.1.1 Statistics

5.1.1.1 Recommendation

In order to provide a better basis for evaluating and managing the resources of small tunas,

> the Committee recommended that FAO urge countries and the various international fisheries bodies to exert greater effort in differentiating species of small tunas in their catch statistics, and to provide the scientific names of the species in order to avoid compilation errors.

5.1.1.2 Recommendation

In order to faciliate the collection of better statistics on small tunas,

> the Committee recommended that FAO expedite the issuance of species identification sheets covering all tunas and tunalike groups on a worldwide basis. Further, FAO should urge international agencies such as IATTC, ICCAT, IPFC, and IOFC to collect better statistics on small tunas, especially *Auxis*.

5.1.1.3 Recommendation

The Committee noted the practice of dumping undesired species at sea and recognized the need for these data in assessing the status of stocks, therefore,

> the Committee recommended that FAO urge countries and the various international fisheries bodies to collect "dumping" statistics, especially for catches of *Auxis* spp., *Euthynnus* spp., and *Orcynopsis unicolor*, as well as the instances of dumping of small *Thunnus albacares* and small *Katsuwonus pelamis*.

5.1.2 Research requirements

5.1.2.1 Recommendation

The Committee noted the general lack of information on the biology, stock identity, and stock assessment of all of the species of small tunas under consideration; therefore,

> the Committee recommended that FAO urge countries and the various international fisheries bodies having a common interest in small tuna to conduct individual or joint resource studies that could lead to a substantial increase in our understanding of the resources of small tunas and especially of stock identity and stock assessment.

5.1.2.2 Recommendation

The Committee recognized the value of the several background documents prepared for the present meeting; therefore,

> the Committee recommended that FAO support the publication of the background reports "The biology, ecology, and resource of the skipjack tuna, Katsuwonus pelamis," by Walter M. Matsumoto and Robert A. Skillman; "Status of knowledge on the biology and resources of the frigate mackerel, genus Auxis," by Richard N. Uchida; "The biology and resources of the bonitos, genus Sarda," and "The biology and resources of the species of Euthynnus," by Howard O. Yoshida; and "Status of the knowledge on the biology and resources of the blackfin tuna, Thunnus atlanticus," by William J. Richards and Harvey R. Bullis, Jr.

5.1.2.3 Recommendation

The Committee noted that most of the small tunas under consideration are products of a multispecies fishery. In many instances this is further complicated by several different methods of harvesting. Noting the complexity of the problems of stock assessment,

> the Committee recommended that FAO and other international fisheries bodies provide guidance in collecting proper and adequate data for stock assessment purposes to countries harvesting these small tunas.

5.2 Specific recommendations

5.2.1 Codex Alimentarius

> The Committee recommended that FAO draw the attention of the Joint FAO/WHO Food Standard Programme Codex Alimentarius Commission to the fact that failure of the Commission to consider approving certain species of tunas and bonitos may retard the development of fisheries for these species in the international market trade.

5.2.2 Katsuwonus pelamis

> The Committee recommended that FAO instruct the Expert Panel for the Facilitation of Tuna Research to form a working party on skipjack tuna, Katsuwonus pelamis, with terms of reference to review, on a continuing basis, the biology and stock assessment of this species throughout the world's oceans.

5.2.3 Auxis spp.

5.2.3.1 Recommendation

> The Committee recommended that FAO adopt the common name frigate tuna for species belonging to the genus

Auxis and that FAO urge countries and international fisheries bodies to also adopt this common name.

5.2.3.2 Recommendation

The Committee recommended that FAO urge Japanese fishery scientists to analyze their unpublished commercial catch data on *Auxis* for purposes of stock assessment, the results to be made available to members of the Working Party on Small Tunas.

5.2.3.3 Recommendation

The Committee recommended that FAO urge countries and international fisheries bodies researching *Auxis* to focus initially on the development of fisheries rather than on management.

5.2.3.4 Recommendation

The Committee recommended that FAO instruct the Working Party on Eggs, Larvae and Juveniles to analyze all of the published and unpublished data on the larvae of *Auxis* and to prepare a report for the Working Party on Small Tunas on the temporal and spatial distribution and abundance of larval *Auxis* throughout the world's oceans.

5.2.4 *Sarda* spp.

The Committee recommended that FAO urge countries and international fisheries bodies conducting research on *Sarda* to include efforts to determine the causal mechanism underlying the marked annual fluctuations in landings of *Sarda*.

5.2.5 *Thunnus atlanticus*

The Committee recommended that FAO instruct the Working Party on Tuna and Billfish Taxonomy to verify the suspected occurrence of blackfin tuna in the eastern Atlantic Ocean.

5.2.6 *Thunnus tonggol*

5.2.6.1 Recommendation

The Committee recommended that FAO instruct the Working Party on Tuna and Billfish Taxonomy to examine specimens of *T. tonggol* from all areas in order to resolve the question of subspeciation.

5.2.6.2 Recommendation

The Committee recommended that FAO urge countries and international fisheries bodies conducting research on *T. tonggol* to include assessment studies of this group, especially for areas where purse seine fishing is contemplated.

5.2.7 *Scomberomorus* spp.

The Committee recommended that FAO urge tuna scientists throughout the world to assist Dr. Bruce B. Collette in his study of the taxonomy of the *Scomberomorus* group by providing specimens, especially those presently designated as *S. guttatus*, *S. lineolatus*, *S. multiradiatus*, *S. plurilineatus*, and *S. semifasciatus*.

5.2.8 Other small tunas

The Committee recommended that FAO urge Japan to prepare status reports of *Allothunnus fallai* and *Gasterochisma melampus*.

Table 1.--Summary of current status of selected species of small tunas.

	Relative importance for commercial development (No. 1 highest rating)								
	Skipjack tuna (Not rated)	Auxis (1)	Sarda (2)	Thunnus atlanticus (6)	Thunnus tonggol (5)	Scomberomorus (4)	Euthynnus (3)	Other species to be considered	Minor
Taxonomy	--	May have problem especially in Atlantic.	No problems--recent study by Collette and Chao (1975).	No problem.	May have a problem; may have more than 1 species or at least subspecies.	Requires substantial work.	No problems.	Allothunnus, Gasterochisma	Acanthocybium, Cybiosarda, Grammatorcynus, Gymnosarda, Orcynopsis
Statistics	Some problems.	Species not differentiated; reported catch gross underestimate of actual catch.	Atlantic probably overestimate particularly early years. No data available Pacific and Indian Oceans.	Underestimate. May have identification problems with small bigeye and yellowfin tunas.	Species occurs in area with poor statistics.	Poor; breakdown by species generally not available. Do not have true measure of effort.	Underestimated--included in other groups or not reported, e.g., Sarda, skipjack tuna.	--	--
Current utilization	Pacific, 574.0 K MT (metric tons); Indian, 30.0 K MT; Atlantic, 115.0 K MT. Total: 730.0 K MT.	Fresh, pickled, dried, bait, smoked, canned. Atlantic, 15.0-20.0 K MT; Pacific, 30.0-60.0 K MT; Indian, 15.0-20.0 K MT. Total: 60.0 K-100.0 K MT.	Fresh, canned. Atlantic, 10.0-60.0 K MT; Pacific, 20.0-120.0 K MT; Indian, 0.5-1.0 K MT. Total: 30.0-180.0 K MT.	Fresh, canned. 0.5-2.0 K MT.	Fresh, canned (Malaysia) probably 20.0 K MT.	Estimated 150.0 K MT. Generally uniform high acceptability of various species.	Pacific and Indian, 40.0 K MT; Atlantic, 20.0 K MT. Total: 60.0 K MT	--	--
Future utilization	Estimated to be substantial.	Potentially good; probably needs gear development.	Major expansion not likely (highly variable catches).	In area of known occurrence, e.g., west. Atlantic, resource base not expected to be large enough for substantial increase with present methods of fishing.	Not great; probably not more than double current catch. Potential for expansion not known for area of present exploitation. Future increase may be of the order of doubling catch in other areas.	Species highly localized and coastal; thus potential expansion probably very limited.	Resource probably large enough for modest increase over current catch.	--	--
Research requirements	Present research effort not commensurate with size and value of resource.	Needs considerable work: species identification, stock identification, stock assessment.	Understand causal mechanism for wide fluctuation, stock assessment, stock identity in some areas, e.g., Peru and Chile.	Species reported in eastern Atlantic--needs verification, stock assessment.	Stock identification localized. Research may be adequate for resource assessment.	Resource localized. Subregional stock identification.	Stock identification; stock assessment.	--	--
Management problems	International management projected.	--	Probably of subregional proportions.	--	--	Multispecies fisheries.	No immediate problems.	--	--

Appendix A

LIST OF PARTICIPANTS

Mr. A. Fonteneau (Committee member)
Centre de Recherches Oceanographiques
ORSTOM
29, rue des Pecheurs
Boite Postale V-18
Abidjan, Ivory Coast

Dr. Robert E. Kearney (Committee member)
South Pacific Commission
Boite Postale D.5
Noumea, New Caledonia

Dr. Shoji Kikawa (Committee member)
Far Seas Fisheries Research Laboratory
1000 Orido, Shimizu 424
Shizuoka, Japan

Mr. W. L. Klawe (Committee member)
Inter-American Tropical Tuna Commission
c/o Scripps Institution of Oceanography
La Jolla, California 92038

Mr. Walter M. Matsumoto
Southwest Fisheries Center
National Marine Fisheries Service, NOAA
P. O. Box 3830
Honolulu, Hawaii 96812

Dr. Peter M. Miyake (Committee member)
International Commission for the
Conservation of Atlantic Tunas
General Mola 17
Madrid 1, Spain

Mr. Alex Rawung
Marine Fisheries Research Institute
Jln. Kerapu 12, Sunda Kelapa
Jakarta, Indonesia

Mr. Richard S. Shomura (Committee member)
Southwest Fisheries Center
National Marine Fisheries Service, NOAA
P. O. Box 3830
Honolulu, Hawaii 96812

Dr. K. Sivasubramaniam (Committee member)
UNDP-Sri Lanka Skipjack Fishery Development
Project
69 Horton Place
Colombo 7, Sri Lanka

Dr. Robert A. Skillman
Southwest Fisheries Center
National Marine Fisheries Service, NOAA
P. O. Box 3830
Honolulu, Hawaii 96812

Mr. Richard N. Uchida
Southwest Fisheries Center
National Marine Fisheries Service, NOAA
P. O. Box 3830
Honolulu, Hawaii 96812

Mr. Jacobus C. B. Uktolseja
Marine Fisheries Research Institute
Jln. Kerapu 12
Jakarta-Utara, Indonesia

Dr. A. Ch. de Vildoso (Committee member)
Instituto del Mar
Esquina Gamarra y General Valle
Callao, Peru

Mr. Minato Yasui
Graduate Student, Tokai University
c/o Southwest Fisheries Center
National Marine Fisheries Service, NOAA
P. O. Box 3830
Honolulu, Hawaii 96812

Mr. Howard O. Yoshida
Southwest Fisheries Center
National Marine Fisheries Service, NOAA
P. O. Box 3830
Honolulu, Hawaii 96812

Appendix B

AGENDA

1. Opening of Meeting
2. Adoption of Agenda
3. Codex Alimentarius
4. Review of Small Tunas List
    a. *Katsuwonus pelamis*
    b. *Auxis* spp.
    c. *Sarda* spp.
    d. *Euthynnus* spp.
    e. *Thunnus atlanticus*
    f. *Thunnus tonggol*
    g. *Scomberomorus* spp.
    h. Other Small Tunas (*Orcynopsis unicolor*, *Cybiosarda elegans*, *Acanthocybium solandri*, *Allothunnus fallai*, and *Gasterochisma melampus*)
5. Summary and Recommendations
6. Adoption of Report

Appendix C

LIST OF BACKGROUND PAPERS

Ad Hoc ST/6	MATSUMOTO, WALTER M., and ROBERT A. SKILLMAN The Biology, Ecology, and Resource of the Skipjack Tuna, *Katsuwonus pelamis*.
Ad Hoc ST/7	UCHIDA, RICHARD N. Status of Knowledge on the Biology and Resources of the Frigate Mackerel, Genus *Auxis*.
Ad Hoc ST/8	YOSHIDA, HOWARD O. The Biology and Resources of the Bonitos, Genus *Sarda*.
Ad Hoc ST/9	YOSHIDA, HOWARD O. The Biology and Resources of the Species of *Euthynnus*.
Ad Hoc ST/10	RICHARDS, WILLIAM J., and HARVEY R. BULLIS, JR. Status of the Knowledge on the Biology and Resources of the Blackfin Tuna, *Thunnus atlanticus*.
Ad Hoc ST/11	SAWYER, PATRICIA, and THOMAS BRITTON, JR. Speciation in the Genus *Auxis* (Scombridae, Pisces).

Appendix D

COMPLETE LIST OF DOCUMENTATION

Ad Hoc ST/1	Provisional Agenda
Ad Hoc ST/2	Provisional Timetable
Ad Hoc ST/3	Proposed Review Subcommittees
Ad Hoc ST/4	List of Participants
Ad Hoc ST/5	List of Background Papers
Ad Hoc ST/6	Matsumoto, Walter M., and Robert A. Skillman. The Biology, Ecology, and Resource of the Skipjack Tuna, *Katsuwonus pelamis*
Ad Hoc ST/7	Uchida, Richard N. Status of Knowledge on the Biology and Resources of the Frigate Mackerel, Genus *Auxis*
Ad Hoc ST/8	Yoshida, Howard O. The Biology and Resources of the Bonitos, Genus *Sarda*
Ad Hoc ST/9	Yoshida, Howard O. The Biology and Resources of the Species of *Euthynnus*
Ad Hoc ST/10	Richards, William J., and Harvey R. Bullis, Jr. Status of the Knowledge on the Biology and Resources of the Blackfin Tuna, *Thunnus atlanticus*
Ad Hoc ST/11	Sawyer, Patricia, and Thomas Britton, Jr. Speciation in the Genus *Auxis* (Scombridae, Pisces)
Ad Hoc ST/12	Interim Draft Report, Fisheries Research Laboratory, Department of Agriculture, Stock, and Fisheries, Papua New Guinea
Ad Hoc ST/13	Some Notes on Several Small Tuna Fisheries in the Indian Ocean
Ad Hoc ST/14	Catch of *Euthynnus affinis* From Papua New Guinea
Ad Hoc ST/15	Catch of Small Tuna and Related Species From Australia
Ad Hoc ST/16	Various Papers on Tunas From Cuba
Ad Hoc ST/17	Skipjack Tuna Fisheries in the Waters Around Taiwan
Ad Hoc ST/18	Skipjack Tuna Fishery and Fishing Grounds (HL/NMFS Translation No. 12)

Ad Hoc ST/19	A Proposal for a Skipjack Survey and Assessment Programme in the Central and Western Equatorial Pacific Ocean (SPC Expert Committee on Tropical Skipjack, 16-18 October 1975)
Ad Hoc ST/20	Family Scombridae (W. L. Klawe, IATTC)
Ad Hoc ST/21	*Thunnus tonggol* in the Indian Ocean
Ad Hoc ST/22	Annual Landings of Four Species (Peru)

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